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ABSTRACT

Children's expectations regarding the roles played in society by different groups of people have been shown to significantly affect their comprehension of sentences. This paper reports on a study designed to examine the way children's expectations affect the strategies they employ in two tasks tapping the organization of the semantic system. Sixty subjects between the ages of eight and twelve individually completed the two tasks: providing word associations for stimulus words and sorting word cards into categories. The paper reports the method used in the data analysis, indicates the types of relationships used by children in performing the tasks (including relationships indicating membership in a group, spatial proximity, and common theme), and points to implications for further research. (GW)

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A Multi-method Paradigm to Investigate Children's Semantic Systems

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A Multi-method Paradigm to Investigate Children's Semantic Systems

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Factors which influence language comprehension are not yet well understood. The state of our knowledge in this area, directed toward answering the question, How do children process sentences?, has recently been characterized as "rudimentary" (Fodor, Bever, & Garrett, 1974). Two major factors have been widely investigated, however: semantics and syntax.

Results of psycholinguistic studies have indicated that syntactic variables, particularly the grammatical structures of a sentence, affect performance in several areas. These include imitation (Love and Parker-Robinson, 1972), retention (Savin and Perchonock, 1965; and de Boysson-Bardies, 1970), and comprehension (Chomsky, 1969). In a parallel manner, semantic variables, such as meaningfulness and logical reversibility, have been found to affect memory (cf. Slobin, 1971, for a description of this paradigm) and comprehension (Slobin, 1966).

Children's expectations regarding the sorts of roles played in society by identifiable groups of people, such as teachers, parents, and children have been demonstrated to be of great

importance in their processing of sentences (Gowie and Powers, 1972; Gowie, in press; Powers and Gowie, in press). In this series of studies, it has been found that sentences reflecting commonly held expectations (e.g., The teacher tells the boy to answer the question) are more easily understood than sentences which are contrary to expectation (e.g., The boy tells the teacher to answer the question). Children's expectations have been identified in these studies through the administration of forced-choice items. Each subject has been asked to select the more likely of two potential agents in sentences describing common activities (e.g., Who would usually wash shirts, mothers or fathers?).

Since such expectations significantly affect children's comprehension of a variety of types of sentences, i.e., of several syntactic structures, further investigation of expectations should provide information regarding an important strategy children employ in processing sentences. It is, therefore, unsatisfactory to rely on a single method of identifying these expectations. A multi-method approach allows us to begin to examine the validity of expectations as a semantic linguistic variable.

PURPOSE

The purpose of this study was to explore the psychological reality of expectations. Earlier studies have shown that expectations affect comprehension; this study was designed to analyze expectations as a constituent of the individual's semantic system.

Two questions were central: 1) will expectations, in the form of agent/action combinations, be apparent in children's word associations, and 2) will expectations provide the basis for a grouping strategy in a sorting task.

METHODOLOGY

Subjects and Procedure

Children participating in the study were between the ages of 8 and 12 years; 12 Ss were in each of the 5 age groups. The schools which the children attend are all within one suburban centralized school district, where the residents are speakers of standard English.

Each child individually completed 2 tasks:

Task I - Word Association: Twenty stimulus words were presented to each child, who responded with the first word that came to mind. The words were selected from items on the expectation assessment questionnaire used previously by this author (Gowie, in press), and were words which might elicit socially-conditioned expectations. Responses were transcribed by E. Whenever there was doubt as to which part of speech was intended, E asked the child to clarify the response. (For example, with vacuum-clean, clean can be a verb or an adjective.) If the child hesitated or failed to respond to a stimulus word, that word was passed over temporarily and repeated later. This task was always administered first, so that the responses would not be influenced by other stimulus materials.

Task II - Card Sort: The same 20 words were each written on 4" x 6" cards. Two sets of cards were made. Each child was directed to sort the cards into as many groups as he or she wished, as long as there were some "good reason" for putting the cards together. After the first sort, the child explained the basis on which each group was formed. Then E directed the child to repeat the task, forming new groups for similarly good reasons. These reasons were also explained. E recorded which items were grouped together, as well as the explanations for each grouping.

Data Analysis

Typically, responses to word association tasks have been analyzed as syntagmatic or paradigmatic, or as homogeneous or heterogeneous by part of speech (Brown and Berko, 1960; Entwisle, Forsyth, & Muus, 1964; Ervin, 1961). However, neither of these methods directly yields information about the organization of the semantic system in terms of the most salient types of relationships the individual sees among words. Still another type of analytic scheme was proposed by Miller (1951), based on relationships such as contrast (wet-dry), subordinate (animal-dog), completion (forward-march), and predication (dog-bark), among others.

Rather than superimposing one of these schemes on the word associatior data, this experimenter analyzed the groups formed in the first card sort, and used the most common sorting strategies as a basis

for classifying responses to the word association task. The underlying assumption was that if the two tasks tap the same organizing structure, then that structure should be recognizable in the responses to both tasks.

The types of relationships children see among words, i.e., the organization of their semantic systems, should be reflected in their word associations as well as in their groupings. Furthermore, if children's semantic expectations are not simply an artifact of the method employed in their identification, then expectations should be reflected in some manner in the responses to the word association and the card sort tasks.

In order to identify the most salient relationships, an incidence matrix was formed (cf. Miller, 1969). This matrix, given in Table 1, shows the number of times each stimulus word was

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Insert Table 1

about here

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grouped with every other stimulus word. Combinations occurring 20 or more times were examined, and the type of underlying relationship was identified and labeled.

The resulting classification categories were compared with the word association data. Insofar as possible, the word associations were tallied as falling into these categories.

RESULTS

The correspondence among the three types of data was quite indirect. In some instances, responses to the word association stimuli were related to functions, e.g., teacher--read. Functional relations were also manifested in the sorting tasks when children grouped agents and actions or instruments, e.g., father/lawnmower/newspaper/read.

Functional relationships accounted for 31 of 469 groups in the first sort. Responses in the second sort yielded 75 agent/action combinations in 424 groups. In sort 1, 10 children used a functional strategy; in sort 2, 24 children used this type of grouping strategy. McNemar's test for the significance of change (Siegel, 1956) disclosed that both differences were statistically significant: for the number of children using the strategy, $p < .025$; for the number of agent/action groups, $p < .001$.

Examination of the incidence matrix resulting from the first card sort disclosed that six groups were formed most frequently: 1) dinner/bake/dishes; 2) shoes/sidewalk; 3) book/pencil/read/newspaper; 4) iron/vacuum; 5) teacher/boy/girl/mother/father; and 6) sidewalk/lawnmower/lawn. These groups seemed to be based predominantly on relationships indicating membership (e.g., teacher, boy, girl, mother, father are all members of the class people),

spatial proximity (e.g., sidewalks, lawns, and lawnmowers are often found near each other), and theme (e.g., bake dinner, then do the dishes).

These 3 categories adequately described 76% (917 of 1200) of the responses to the word association stimuli. Of the remaining 283 responses, 133 were functional (e.g., teacher-read; father-work), and 150 were either descriptive (lawn-grassy), synonymous (e.g., promise-vow), derivative (e.g., sidewalk-walk), or completions (e.g., vacuum-cleaner; iron-shirt). However, only 13 of the 133 responses classified as functional were clearly agent/action pairs.

DISCUSSION

The purpose of this study was to explore the psychological ramifications of expectations. It has been amply demonstrated that expectations affect the understanding of sentences. This study was designed to examine the potency of expectations as a basis of strategies employed in 2 tasks tapping the organization of the semantic system.

Several results are of interest. It is noteworthy that the word associations could be described reasonably well by the major categories generated in the card sort (based on proximity, membership, or theme). If this finding were substantiated in replications, it might help us to identify more confidently the limitations on the types of relationships among words which are

most salient for children. We might thereby be able to reduce to a more efficient and parsimonious set the "amazing number of ways" (Miller, 1951) in which words can be related. It does seem to make logical sense to use the children's responses as the data base for devising the classification scheme for analyzing word associations. Although many types of relationships are, indeed, possible among words, the number, variety, and quality may be an individual difference of interest.

The limitations of this method, however, deserve attention. Even though precautions were taken to determine the part of speech of the responses whenever they might be ambiguous (e.g., vacuum-clean), further types of ambiguity were noted once the analysis was underway. It became obvious that exact classification would have required children's explanations of their word associations. For example, pencil-pen might be a coordinate association, based on membership, since both are writing instruments. It might also be thematic, if the child were thinking about school classrooms. Within that same context, the association might be locational or proximate, since pencils and pens are often found together. Still another possibility is that it is merely a completion, due to the association of these words in everyday speech, as in pen and pencil sets. Finally (?), this might also be classified as derivative, much like squirtgun squirt, and sidewalk-walk.

The responses of one 12 year old boy to the second card sort brought to the writer's attention a limitation of that procedure. The boy's responses were not included in the analysis because he did not form groups. Instead, he placed the cards in what he called "intersections and sub-sets." In actuality, this approach more nearly approximates the relationships among words, since certain features are shared with other words, whereas certain other features are not. Discrete groups do not reflect this overlap, nor do they allow the subject to express his or her awareness of shared features.

A final result which should be investigated further is the significantly greater use of agent/action combinations in card sort 2. It may be that children in this age group initially see relationships in terms of membership, proximity, or theme. Then, when asked to suggest alternative systems, they employ the less abstract agent/action scheme.

The card sort appeared to be measuring cognitive variables as well as semantic organization. Differences in children's approaches to the tasks were obvious in many ways, e.g., in the number of groups formed, in the number of cards left singly, being considered unrelated to any others, in the quality of explanation offered regarding the basis for forming the groups, and in the deliberateness with which the task was undertaken. Such differences might well be examined further.

With reference to the two central questions in this study, a new understanding of expectation is suggested. First, there clearly are specific expectations regarding "who does what" around the house or in the classroom. But these are only one type of expectations, namely that words can be related according to the "functions" of the referents (e.g., teachers read, mothers bake, fathers mow lawns). Other types of expectations set limits on relationships among words, and therefore, on the organization of the semantic system, according to proximity, membership, and theme, etc. These expectations are of a more general or universal type, and may be similar to the cases (e.g., nominative, possessive, locative) which may constitute a case structure grammar. There is, therefore, an important distinction between specific situational expectations and expectations regarding categories of potential relationships, i.e., the rules regarding the organization of the semantic system.

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TABLE 1

Incidence Matrix:
First Card Sort

Dinner	Lawn	Promise	Shoes	Bake	Book	Dishes	Pencil	Iron	Teacher	Sidewalk	Squirtgun	Vacuum	Boy	Lawnmower	Mother	Father	Read	Girl	Newspaper	
	5	3	3	48	2	46	4	8	1	3	3	9	2	4	3	4	1	3	2	Dinner
		8	8	3	4	7	6	9	1	32	8	8	2	51	1	6	2	1	9	Lawn
			2	5	4	4	7	3	8	5	5	2	4	5	3	4	5	2	4	Promise
				3	5	6	7	7	6	24	12	5	6	7	4	3	2	5	5	Shoes
					1	39	3	13	0	2	3	12	2	4	4	2	2	3	0	Bake
						4	29	4	7	3	5	4	2	3	1	2	47	1	42	Book
							9	14	3	6	8	14	3	8	4	2	2	4	3	Dishes
								9	20	5	8	7	2	7	1	3	17	1	16	Pencil
									1	4	6	46	1	13	7	3	2	3	2	Iron
										2	4	1	28	1	32	31	9	28	3	Teacher
											13	6	3	26	1	5	0	2	9	Sidewalk
												8	10	11	2	2	0	7	6	Squirtgun
													3	13	8	2	3	6	2	Vacuum
														2	44	45	2	53	1	Boy
															1	5	0	1	8	Lawnmower
																51	1	45	1	Mother
																	2	42	5	Father
																		1	41	Read
																			1	Girl
																				Newspaper